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EXAMINER	
AGHDAM, FRESHTEH N	
ART UNIT	**PAPER NUMBER**
2631	

DATE MAILED: 10/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/082,351	CRIPPS ET AL.	
	Examiner	Art Unit	
	Freshteh N. Aghdam	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments see page 12, filed 07/19/2005, with respect to the rejection(s) of claim(s) 1-22 under Shapira (US 2003/0060205) and Rouphael et al (US 6,400,317) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Zhang (US 6,369,758).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 5-7, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhang (US 6,369,758).

As to claims 1 and 22, Zhang teaches a method for enhancing a data signal associated with a pilot signal comprising: receiving a plurality of pilot signals on a plurality of antenna elements (Fig. 1; 1-M), each data signal from the plurality of data signals being uniquely associated with a pilot signal from the plurality of pilot signals (Fig. 1-2; Col. 2, Lines 46- Col. 3, Line 18), each pilot signal from the plurality of pilot

signals having a first characteristic (Fig. 1-4: Col. 3, Lines 1-18) and a second characteristic (power characteristics; Col. 3.Lines 19-30); identifying a first pilot signal from the plurality of pilot signals based on the first characteristic of the first pilot signal (Col. 3, Lines 1-18); and adjusting a first weight value associated with each antenna element form the plurality of antenna elements so that the second characteristic of the first pilot signal (power characteristics) is substantially optimized with respect to the second characteristic of the remaining pilot signals from the plurality of pilot signals (Col. 1, Lines 21-36; Col. 2, Lines 29-63; Col. 3, Lines 1-18 and 53- Col. 4, Lines 1-18 and 61- Col. 5, Line 6).

As to claim 2, Zhang teaches modifying the data signal associated with the first pilot signal based on the first weight value (i.e. in-phase component) and a second weight value (quadrature component) associated with each antenna element from the plurality of antenna elements to produce a modified data signal (Fig. 1, means 12, 18, 20, 22, 24, and 30); modifying a transmission data signal based on the first weight value and the second weight value associated with each antenna element from the plurality of antenna elements (Col. 3, Lines 53- Col. 4 Line 28); and transmitting the modified transmission data signal to down stream elements such as summer 26 and OFDM receiver 30 (Fig. 1).

As to claim 5, Zhang teaches the plurality of data signals is associated with a data frequency band within an allocated frequency band (Fig. 2); the plurality of pilot signals each is uniquely associated with a pilot signal band (subcarrier) within the allocated frequency band and outside the data frequency band (Fig. 2; Col. 4, Lines 29-

41); the first characteristic of each pilot signal from the plurality of pilot signals is at least one from the group of a frequency of an unmodulated carrier wave, a modulation, and a frequency of a modulated carrier wave(Col. 3, Lines 1-18); and the second characteristic of each pilot signal from the plurality of pilot signals is a power associated with the pilot signal (Col. 3, Lines 1-18; power characteristics).

As to claim 6, Zhang teaches a plurality of data signals is associated with a data frequency band (Fig. 2; Col. 4, Lines 29-41); the plurality of pilot signals is associated with the data frequency band (Fig. 2); the first characteristic of each pilot signal from the plurality of pilot signals is a spread spectrum pseudo noise sequence (Col. 3, Lines 1-18; power characteristics); and the second characteristic of each pilot signal from the plurality of pilot signals is a power in spread spectrum associated with that pilot signal (Col. 3, Lines 1-18; power characteristics).

As to claim 7, Zhang teaches the plurality of data signals is associated with a data frequency band (Fig. 2); the plurality of pilot signals is associated with the data frequency band, each pilot signal being associated with its own time delay from the associated data signal from the plurality of data signals (Fig. 2, means 40, 44; Col. 4, Lines 29-41); the first characteristic of each pilot signal from the plurality of pilot signals is the associated time delay (Fig. 2, Col. 3, Lines 1-18; Col. 4, Lines 29-41); and the second characteristic of each pilot signal from the plurality of pilot signals is a power in spread spectrum associated with that pilot signal (Col. 3, Lines 1-18; power characteristics).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3-4, 8-11, 12-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang.

As to claim 3, Zhang teaches an adaptive antenna array system and/or method comprising: filtering the plurality of signal samples for the first pilot signal to produce a plurality of in-phase signal samples and a plurality of quadrature signal samples (Fig. 1, means 16 and 18), the first weight value being associated with the plurality of in-phase samples, a second weight value being associated with the plurality of quadrature signal samples (complex weight values); and iteratively (adaptive antenna controller) adjusting the first weight value and the second weight value associated with each antenna element from the plurality of antenna elements so that the second characteristic of the first pilot signal (power characteristics) is substantially optimized with respect to the second characteristic of the remaining pilot signals from the plurality of pilot signals (Fig. 1, means 12, 16, 18, 22, and 24; Col. 1, Lines 22-38; Col. 2, Lines 29-63; Col. 3, Lines 1-18 and 53- Col. 4, Lines 1-18 and 61- Col. 5, Line 6). One of ordinary skill in the art would clearly recognize that storing data in a type of memory is well known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art to use a type of memory to store data for further processing.

As to claim 4, Zhang teaches scanning for each antenna element from the plurality of antenna elements, the plurality of signal samples for the first pilot signal to produce an indication of a beginning of the data signal (Fig. 2) associated with the first pilot signal (Fig. 1-2, means 20 and 42); and initially applying the first weight value to the data signal associated with the first pilot signal at the beginning indication (Col. 4, Lines 19-28). Zhang is silent about applying an end indicator at the end of the data signal. One of ordinary skill in the art would clearly recognize that different frame formats are known in the art and a null symbol could be placed at the end of a frame for identifying the end of the symbol as it is illustrated in figure 4. Therefore, it would have been obvious to one of ordinary skill in the art to place a null symbol at the end of the data signal (Fig. 4; Tg) in order to indicate end of the data signal for synchronization purposes (timing controlling).

As to claims 8-11, Zhang teaches each data signal from a plurality of data signals is uniquely associated with a frequency from a plurality of frequencies (Fig. 2); each pilot signal from the plurality of pilot signals is uniquely associated with a modulation code (OFDM modulation), and a remaining frequency from the plurality of frequencies (Fig. 2); the first characteristic of each pilot signal from the plurality of pilot signals is the modulated code (such as QPSK) see (Fig. 2, Col. 3, Lines 1-18; Col. 4, Lines 29-41); and the second characteristic of each pilot signal from the plurality of pilot signals is a power associated with that pilot signal (Col. 3, Lines 1-18; power characteristics). One

of ordinary skill in the art would clearly recognize that different types of modulation schemes are well known in the art and correspond to the type of modulation scheme used at the transmitter. Therefore, it would have been obvious to one of ordinary skill in the art to use different modulation schemes to modulate data signal in order to vary some characteristics of the carrier signal such as phase, frequency, amplitude, and ... in a data transmission system and transmitting the signal accordingly, in which is recognizable by receiver.

As to claim 12, Zhang teaches a plurality of antenna elements (Fig. 1, means 12) configured to receive a plurality of data signals and a plurality of pilot signals (Fig. 2), each data signal from the plurality of data signals being uniquely associated with a pilot signal from the plurality of pilot signals (Fig. 1-2; Col. 2, Lines 46- Col. 3, Line 18), each pilot signal from the plurality of pilot signal having a first characteristic and a second characteristic (Col. 3, Lines 1-18), a plurality of circuits each coupled to an antenna element from the plurality of antenna elements, each circuit having: a filter configured to receive the plurality of data signals and the plurality of pilot signals and to produce a first signal component (in-phase component; Fig. 1, means 18; Col. 3, Lines 53- Col. 4, Line18) and a second signal component (quadrature component; Fig. 1, means 18); a complex weight application module coupled to the filter (Fig. 1, means 18 and 24), the complex weight application module configured to receive the first signal and second signal components (in-phase and quadrature components) and to apply the complex weight values to the first signal component and the second signal component; a processor coupled to the plurality of circuits, the processor configured to determine a

first pilot signal from the plurality of pilot signals based on the first characteristic of the first pilot signal (Col. 3, Lines 1-18; separation of training signal from noise; auto-correlation properties); and a best solution selector (Fig. 1, means 22) coupled to the complex weight application module of each circuit from the plurality of circuits (Fig. 1), the best solution selector configured to select an iteration value (adaptive antenna array controller) for the complex weight value based on the second characteristic of the pilot signal (power characteristics; Fig. 1, Col. 1, Lines 22-38; Col. 3, Lines 1-18 and 53- Col. 4, Lines 1-18 and 61- Col. 5, Line 6). Zhang does not expressively teach the weight values 24 are comprised of first (in-phase) and second (quadrature) weight values. One of ordinary skill in the art would clearly recognize that since the in-phase and quadrature components are separated (Fig. 1, means 18); therefore, the first (real) and second (imaginary) weight values are calculated by the adaptive antenna controller 22 to be applied to the signals are comprised of the first (real) and second (imaginary) weight values.

As to claim 13, Zhang teaches the complex weight values are calculated (Fig. 1, means 22 and 24) in such a way that the second characteristic (power characteristics) of the first pilot signal is optimized with respect to the remaining pilot signals ((Col. 1, Lines 21-36; Col. 2, Lines 29-63; Col. 3, Lines 1-18 and 53- Col. 4, Lines 1-18 and 61- Col. 5, Line 6).

As to claim 14, Zhang teaches a filter (Fig. 1, means 20) that identifies a start indicator (null symbol) of the data signal from the plurality of data signals associated with the first pilot signal; and a complex weight module coupled to the second filter (Fig.

1, means 20 and 22) and it is configured to receive the start indicator. Zhang is silent about the end indicator and the final complex weight values are determined by the filter. One of ordinary skill in the art would clearly recognize that since the antenna array controller 22 is adaptive, it will reach a final value eventually; and moreover, different frame formats are known in the art and a null symbol could be placed at the end of a frame for identifying the end of the symbol as illustrated in figure 4. Therefore, it would have been obvious to one of ordinary skill in the art to place a null symbol at the end of the data signal (Fig. 4; Tg) in order to indicate end of the data signal for synchronization purposes (timing controlling).

As to claim 15, Zhang teaches the plurality of data signals is associated with a data frequency band within an allocated frequency band (Fig. 2); the plurality of pilot signals each is uniquely associated with a pilot signal band (subcarrier) within the allocated frequency band and outside the data frequency band (Fig. 2; Col. 4, Lines 29-41); the first characteristic of each pilot signal from the plurality of pilot signals is at least one from the group of a frequency of an unmodulated carrier wave, a modulation, and a frequency of a modulated carrier wave(a modulation; Col. 3, Lines 1-18; Col. 4, Lines 29-41); and the second characteristic of each pilot signal from the plurality of pilot signals is a power associated with the pilot signal (Col. 3, Lines 1-18; power characteristics).

As to claim 16, Zhang teaches a plurality of data signals is associated with a data frequency band (Fig. 2; Col. 4, Lines 29-41); the plurality of pilot signals is associated with the data frequency band (Fig. 2); the first characteristic of each pilot signal from the

plurality of pilot signals is a spread spectrum pseudo noise sequence (Col. 3, Lines 1-18; power characteristics); and the second characteristic of each pilot signal from the plurality of pilot signals is a power in spread spectrum associated with that pilot signal (Col. 3, Lines 1-18; power characteristics).

As to claim 17, Zhang teaches the plurality of data signals is associated with a data frequency band (Fig. 2); the plurality of pilot signals is associated with the data frequency band, each pilot signal being associated with its own time delay from the associated data signal from the plurality of data signals (Fig. 2, means 40, 44; Col. 4, Lines 29-41); the first characteristic of each pilot signal from the plurality of pilot signals is the associated time delay (autocorrelation properties; Fig. 2, Col. 3, Lines 1-18; Col. 4, Lines 29-41); and the second characteristic of each pilot signal from the plurality of pilot signals is a power in spread spectrum associated with that pilot signal (Col. 3, Lines 1-18; power characteristics).

As to claims 18-21, Zhang teaches each data signal from a plurality of data signals is uniquely associated with a frequency from a plurality of frequencies (Fig. 2); each pilot signal from the plurality of pilot signals is uniquely associated with a modulation code (OFDM modulation), and a remaining frequency from the plurality of frequencies (Fig. 2); the first characteristic of each pilot signal from the plurality of pilot signals is the modulated code (such as QPSK) see (Fig. 2, Col. 3, Lines 1-18; Col. 4, Lines 29-41); and the second characteristic of each pilot signal from the plurality of pilot signals is a power associated with that pilot signal (Col. 3, Lines 1-18; power characteristics). One of ordinary skill in the art would clearly recognize that different types of modulation

schemes are well known in the art and correspond to the type of modulation scheme used at the transmitter. Therefore, it would have been obvious to one of ordinary skill in the art to use different modulation schemes to modulate data signal in order to vary some characteristics of the carrier signal such as phase, frequency, amplitude, and ... in a data transmission system and transmitting the signal accordingly, in which is recognizable by receiver.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Krishnamoorthy et al (US 6,782,037) see Fig. 3, Col. 5 and 6; related to claims 8-11 and 18-21; Sato (US 2005/0083875) see Par. 5, 8, and 9; related to claims 5-7 and 15-17.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Freshteh N. Aghdam whose telephone number is (571) 272-6037. The examiner can normally be reached on Monday through Friday 9:00-5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Freshteh Aghdam
October 3, 2005

KEVIN BURD
PRIMARY EXAMINER